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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/863,150	05/23/2001	Mark Leonard O'Neill	06150 USA	1068

23543 7590 05/16/2003

AIR PRODUCTS AND CHEMICALS, INC.
PATENT DEPARTMENT
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EXAMINER

MEEKS, TIMOTHY HOWARD

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 05/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/863,150

Applicant(s)

O'NEILL ET AL.

Examiner

Timothy H. Meeks

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-75 is/are pending in the application.
- 4a) Of the above claim(s) 1-17, 70 and 71 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-69 and 72-75 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-75 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Application Status

The amendment filed on April 1, 2003 in response to the Office Action mailed on January 2, 2003 has been fully considered. In the amendment, applicants have amended claims 18, 27, 47, 57, and 72. Claims 1-17, 70, and 71 are withdrawn from further consideration. Claims 18-69 and 72-75 are under consideration. This action is being made non-final as a new rejection is set forth above that was not necessitated by applicants' amendments. Specifically, the obviousness rejection based solely upon Grill is withdrawn in favor of the rejection set forth below.

Election/Restrictions

Applicant's election with traverse of claims 18-69 and 72-75 in Paper No. 5 is acknowledged. The traversal is on the ground(s) that there is no serious burden on the Patent Office to examine both inventions. This is not found persuasive because determining the patentability of the claimed products would require consideration of substantially different issues than those required for determining patentability of the processes. Given the different issues regarding the determination of patentability and that the inventions are distinct for the reasons established previously, a serious burden exists to examine both inventions.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 72-75 are rejected under 35 U.S.C. 102(e) as being anticipated by Rose et al.

(6,068,884).

Rose discloses a process comprising providing an organosilicate glass film from chemical vapor deposition of an organosilane or organosiloxane wherein NF_3 or SiF_4 are added to the plasma to form fluorine-doped films (col. 5, lines 49-68 and col. 6, lines 40-44). With respect to the added limitation of providing an oxygen providing gas, this is explicitly disclosed at col. 7, lines 50-51 and col. 8, lines 35-41. As the film of Rose is formed in the same manner disclosed and claimed by applicants, the films will inherently have the same properties and inherently possess the improved properties of claims 73-75.

Claims 72-75 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsuki (6,410,463).

The claimed process is disclosed at Example 2 in Table 1. With respect to the added limitation of providing an oxygen-providing gas, the examiner submits that the DM-DMOS provides oxygen as it is decomposed to release oxygen during the Matsuki deposition.

Furthermore, Matsuki discloses to add a small amount of oxidizing gas at col. 5, lines 56-58. As the film of Matsuki is formed in the same manner disclosed and claimed by applicants, the films

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will inherently have the same properties and inherently possess the improved properties of claims 73-75.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 18-47, 53-66, 68, 69, and 72-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grill et al. (6,147,009).

Grill et al. disclose a process for forming an organosilica glass film having about 5 to about 40% Si, about 5 to about 45% C, about 0 to about 50% O, and about 10 to about 55% H, and optionally containing F to modify the low-k film properties (col. 6, lines 25-45, col. 7, lines 1-5), comprising introducing an organosilane or organosiloxane precursor, oxygen-containing gas, and a fluorine-containing gas to a plasma CVD chamber and forming a plasma of the gas to form the film (col. 3, lines 15-30, col. 7, lines 1-5). Use of plasma power densities, flow rates, and pressures and film thicknesses and dielectric constants in the claimed ranges are disclosed at col. 3, lines 30-40 and the examples. Use of the claimed plasma power sources is disclosed at col. 3, lines 1-15. Use of the layer as an ILD material is disclosed at col. 3, lines 55-60. Use of a carrier gas of He or Ar is disclosed at col. 5, lines 40-45. Performance of an after-deposition stabilization anneal is disclosed in the examples which constitutes the claimed thermal post-treatment. The claimed precursors are disclosed at col. 3, lines 15-30 and the examples.

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The ranges of amounts of Si, C, O, and H in the film of Grill overlap the claimed ranges. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness, see *In re Malagari*, 182 USPQ 549.

Grill does not disclose the absence of C-F bonds in the film or the particular fluorine precursors of these claims. However, because Grill is silent as to the particular fluorine source to use and Rose discloses that NF_3 and SiF_4 are effective for fluorine-doping OSG films when combined with an organosilane or siloxane (col. 6, lines 40-50), it would have been obvious to use the claimed fluorine compounds with the reasonable expectation of their being effective for adding the fluorine to the films. As none of the silicon or fluorine precursors for forming the film contain C-F bonds, the deposited film would not contain C-F bonds.

Grill is silent as to the amount of fluorine to include in the film, however, discloses that it is added to modify the low-k film properties, fluorine addition generally being known to lower dielectric constants of silicon oxide films (see for example, col. 2, lines 1-10 of USP 5,827,785, cited by applicants). Therefore, the amount of fluorine added to the film is a result effective parameter affecting the low-k film properties such as lowering dielectric constant, it would have been obvious to adjust the amount of fluorine in the film through routine experimentation to values in the claimed range to optimize the properties of the film.

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Claims 48-52 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grill in view of Rose as applied above, and further in view of Lee et al. ("Recent Progress in PECVD Low-k Dielectrics..." article cited by applicants).

The claimed densities or pore sizes or addition of a porogen to add porosity is not explicitly disclosed by Grill. However, because Lee et al. disclose that addition of porogens to OSG films with subsequent annealing to burn out the porogens provides porosity to the films and lowers their dielectric constant (2nd column) it would have been obvious to add porogens to provide more porous, and hence, less dense, films so as to lower dielectric constants of the films. The claimed pore sizes and densities would have been derived through routine experimentation to optimize the dielectric constants of the films.

Response to Arguments

Applicant's arguments have been considered but are not persuasive. Applicants argue that Rose discloses no embodiment wherein solely inorganic fluorine sources are used. The examiner respectfully disagrees. Rose explicitly discloses an embodiment wherein NF₃ is used as the fluorine source and another embodiment wherein SiF₄ is used as the fluorine source, both of which include only inorganic fluorine.

Applicants argue that Matsuki does not provide an oxygen providing gas. The examiner submits that Matsuki explicitly discloses this limitations as explained in the rejection above

Applicants argue that Grill, Rose, and Lee do not recognize the importance of inorganic fluorine. The examiner submits that use of NF₃ or SiF₄ sources is obvious for the reasons above. The mere observation of still another beneficial result of an old process cannot form the basis of patentability. *Allen et al. v. Coe*, 57 USPQ 136; *In re Maeder et al.* 143 USPQ 249. Applicants

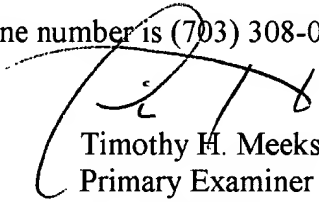
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argue that there is an unexpected improvement obtained from using the inorganic fluorine source. However, no evidence has been provided which objectively shows an "improvement" that is commensurate in scope with the instant claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy H. Meeks whose telephone number is (703) 308-3816. The examiner can normally be reached on Mon., Tues., Thurs.(6-6:30), Fri.(6:30-10:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Timothy H. Meeks
Primary Examiner
Art Unit 1762

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May 15, 2003